LARVAE OF TWO SPECIES OF GENUS HETERONYCHUS FROM NIGERIA (DYNASTINAE: SCARABAEIDAE: COLEOPTERA)

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Several species of the genus *Heteronychus* are of great importance to the agriculturist in many parts of Africa and Australia. Extensive damage to sugar cane, maize, rice, wheat and many other crops caused by adults, and sometimes by larvae, has been reported by several writers (Le Pelley and Goddard, 1952; Valle y March, 1954; Jepson, 1956 and Britten, 1959). The adults usually spend a greater part of their life underground and damage the tap roots, stem bases, tubers (potatoes) and the cuttings, young shoots and ratoon canes of sugar cane.

In Nigeria, *H. licas* (Klug) damage yams (*Dioscoria* spp.) and sugar cane. The damage to sugar cane is very severe at Bacita, Northern Nigeria, and is caused by both adults and larvae.

African Dynastid larvae are rather poorly known as the only Dynastid larvae described to date are *Oryctes boas* (F.), *Temnorhynchus coronatus* (F.), (Oberholzer, 1959 and 1963) and *Heteroligus meles* (Billb.) (Jerath and Unny, 1963).

In this paper, the biology of *Heteronychus* spp. is briefly outlined, the larvae of *H. licas* and *H. fossor* Reiche described, a key presented for the separation of the larvae of two species of *Heteronychus* characterized and compared with other Dynastid larvae.

BIOLOGY

In Nigeria, *Heteronychus licas* and *H. oryzae* cause damage to sugar cane at Bacita, Northern Nigeria, where a 10,000 acre sugar cane plantation is being established. The beetles chew the sugar cane stem and cause dead hearts. The attack is severe in newly planted cane fields. Larvae usually feed on the grass and sugar cane roots.

In Nigeria, *Heteronychus* spp. have one generation with two nocturnal flight periods a year. The first flight or post-teneral flight occurs during the period April to early June when the beetles distribute themselves in the field and are commonly seen feeding at ground level on the young tillers.

During June to August beetles usually burrow to a depth of 12 to 18 inches and rest. They again come up in September and feed on the new

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tillers. By this time many beetles are seen mating. The second flight or pre-reproductive flight occurs during the period October to December. Oviposition begins by mid-September and eggs are laid in the wet soil around the sugar cane stool. The eggs hatch in 9 to 12 days and the larval stages are commonly found from late September until late February or early March when newly emerged adults make their appearance.

LARVAL TAXONOMY

Larvae of the genus *Heteronychus* may be characterized as follows: Surface of cranium reticulate. Ocelli present. Lateral margin of labrum (and epipharynx) angulate posteriorly especially on the left side. Antenna four-segmented, first and third segments subequal and each smaller than second segment; the fourth segment fusiform and bearing a single sensory spot dorsally and two sensory spots ventrally. Left mandible with S_{1+2}, S_3 and S_4 and right mandible with S_{1+2} and S_{3+4}. Stipes of maxilla with a longitudinal row of 7 to 9 blunt, truncate, stridulatory teeth and a distal blunt tubercle. Abdominal spiracles on segments one to seven inclusive equal in size and that of segment eight much smaller. Abdominal segments 1 to 6, each with three dorsal annulets and dorsa of segments 7 to 10 undivided; dorsa of segments 1 to 6 with numerous rows of setae; those of segment 7 to 9 are with two rows of setae, one row placed anteriorly and the other posteriorly. Raster with a teges consisting of a broad patch of prominent hamate setae; lower anal lip with similar hamate setae; palidia absent. Two setae on each claw.

The larvae of genus *Heteronychus* agree with the American Dynastid larvae in the essential characters given by Richter (1944). However, the larvae of *Heteronychus* differs from *Oryctes boas* and *Heteroligus meles* in having one dorsal sensory spot on the last antennal segment, and also differs from *Temnorhynchus coronatus,* in that the last abdominal spiracle is much smaller than the other spiracles.

KEY TO THE LARVAE OF THE TWO SPECIES OF HETERONYCHUS

Right and left chaetoparia of epipharynx with many rows of setae; lateral face of each mandible with 7 to 8 setae, scrobis with one to two setae (fig. 4)--------LICAS
Left chaetoparia with one row of setae (fig. 8); lateral face of each mandible with four setae; scrobis with one to two setae (fig. 5)----------------------FOSSOR

Heteronychus licas (Klug). Third-stage larva.

(FIGS. 1-5, 7, 9, 12 and 13)

Material studied: (a) Two third-stage larvae collected from sugar cane fields at Bacita during December 1964. The reared adults were identified by the Commonwealth Institute of Entomology, London.

(b) Three-stage larvae reared from the eggs laid in the laboratory by beetles collected from sugar cane fields at Bacita, Northern Nigeria, during 1964.

Description: Maximum width of head capsule of third-stage larvae ranging from 4.87 to 5.31 mm. Cranium reddish brown with many pits. Frons, on each side, with three anterior frontal setae, one long and three short posterior frontal setae, one short and two long setae in each anterior angle and one long and two short exterior frontal setae. Epicranium with two long and two short dorso-epicranial setae.

Haptomeral process on epiphyarnx entire or notched. Left and right chaetoparia with many rows of stout setae. Lateral face of mandible with 7 to 8 setae; scrobis with 1 to 2 setae.

Thoracic spiracle .06 to .62 mm. long and .40 to .42 mm. wide. Abdominal spiracles of 1st segment .60 to .63 mm. long and .40 to .42 mm. wide and of last segment .35 to .37 mm. long and .27 to .30 mm. wide.

Dorsum of abdominal segment 7 with an anterior row of four long and six to eight short, rather stout setae, posteriorly with a row of sparse, long, slender setae. Raster with a teges of 38 to 40 hamate setae, scattered on the posterior two thirds of the tenth venter.

Heteronychus fossor Reiche. Third-stage larva.

(FIGS. 6, 8, 10 and 11)

Material studied: One third-stage larva and a cast skin of one third-stage larva reared to the adult stage, No. ON 210 (a) dated March, 1965, collected at Onitsha by M. L. Jerath. The reared adult was identified by Commonwealth Institute of Entomology.

Description: Maximum width of head capsule of third-stage larva 3.87 mm. Cranium light yellowish brown, and with few pits. Frons, on each side, with two long anterior frontal setae, one long exterior frontal seta, one short and two long setae in each anterior angle and one long and three short posterior frontal setae. Epicranium with two long and two short dorso-epicranial setae.

Haptomeral process on epipharynx entire, not notched. Right chaetoparia with many rows of setae; left chaetoparia with only one row of stout setae near the tormae. Lateral face of mandible with four setae; scrobis with one to two setae.

Thoracic spiracles .45 to .47 mm. long and 0.30 to .35 mm. wide. Spiracles of first abdominal segments .35 to .37 mm. long and .27 to .30 mm. wide and that of last abdominal segment .20 to .23 mm. long and .16 to .18 mm. wide.

Dorsum of abdominal segment 7 with an anterior row of four long, slender setae and 14 to 18 short, rather stout setae, posteriorly with a row of sparse, long, slender setae. Raster with a teges of about 30 short, slightly curved setae, scattered on the posterior one-third of the tenth venter.

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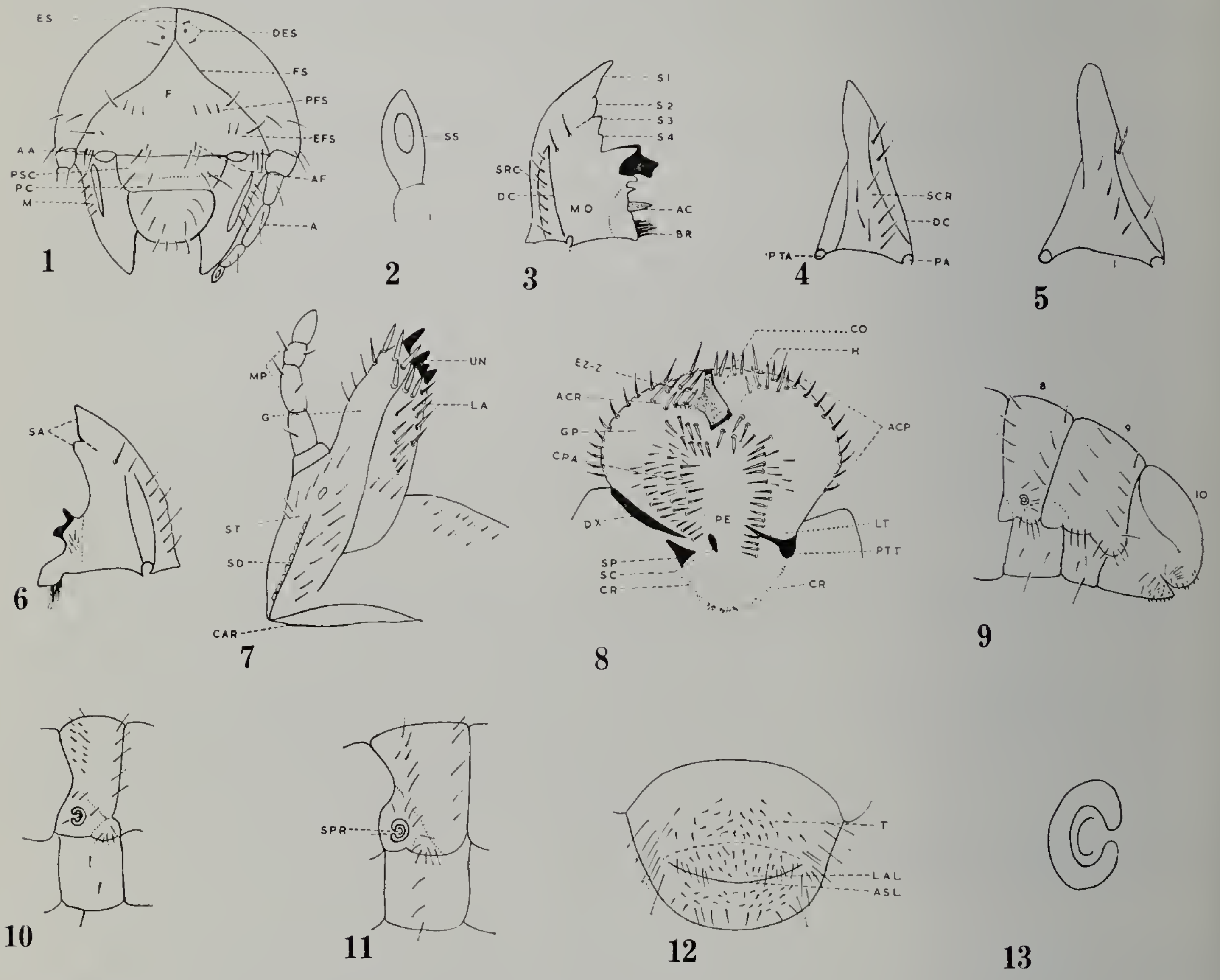

FIGURES 1-13. Larvae of *Heteronychus* sp.

H. licas. 1—Head capsule. 2—Last antennal segment. 3—Left mandible dorsal view. 4—Left mandible lateral view. 5—Right mandible dorsal view. 7—Maxilla ventral view. 9—7th abdominal segment. 12—Raster. 13—Abdominal spiracle.

H. fossor. 6—Left mandible lateral view. 8—Epipharynx. 10—7th Abdominal segment. 11—Last three abdominal segments, side view.

Symbols Used. A = Antenna; AA = Anterior frontal angle; AC = Acia; ACP = Acanthoparia; ACR = Acroparia; AFS = Anterior frontal seta; ASL = Anal slit; BR = Brustia; C = Campus; CAR = Cardo; CO = Corypha; CPA = Chaetoparia, CR = Crepis; DES = Dorsodepicranial setae; DIP = Dorsal impressed line; DMS = Dorsomolar; DX = Dexiotorma; E = Epicranium, EFS = Exterior frontal setae; ES= Epicranial suture; EZ = Epizygum; F = Frons; FS = Frontal suture; G = Galae; GP = Gymnoparia; HL = Haptolachus; LA = Lacinia; LAL = Lower anal lip; LT = Laeotorma; MA = Mala; MO = Molar area; PC = Preclypeus; PE = Pedium; PFS = Posterior frontal setae; PRSC = Prescutum; PSC = Postclypeus; PTT = Pternotorma; S_{1-4} = Scissorial teeth; SA = Scissorial area; SC = Sense cone; SCL = Scutellum; SCU = Scutum; SD = Stridulatory teeth; SN = Scissorial notch; SPA = Spiracular area; SPA = Spiracle; SS = Sensory sensilla; ST = Stipes; STA = Stridulating area; T = Teges; UN = Uncus; VP = Ventral process; Z = Zygum.